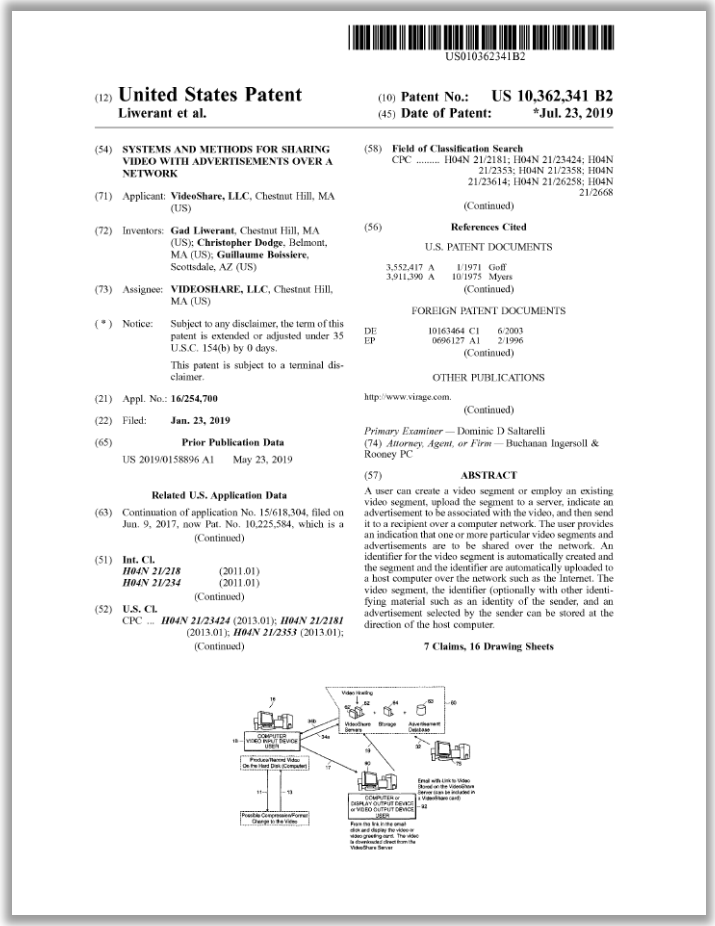
EXHIBIT 2

U.S. Patent No. 10,362,341 – Facebook



US010362341B2

(12) **United States Patent**
Liwerant et al.

(10) **Patent No.: US 10,362,341 B2**
(45) **Date of Patent: *Jul. 23, 2019**

(54) **SYSTEMS AND METHODS FOR SHARING VIDEO WITH ADVERTISEMENTS OVER A NETWORK**

(71) Applicant: **VideoShare, LLC**, Chestnut Hill, MA (US)

(72) Inventors: **Gad Liwerant**, Chestnut Hill, MA (US); **Christopher Dodge**, Belmont, MA (US); **Guillaume Boissiere**, Scottsdale, AZ (US)

(73) Assignee: **VIDEOSHARE, LLC**, Chestnut Hill, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/254,700**

(22) Filed: **Jan. 23, 2019**

(65) **Prior Publication Data**

US 2019/0158896 A1 May 23, 2019

Related U.S. Application Data

(63) Continuation of application No. 15/618,304, filed on Jun. 9, 2017, now Pat. No. 10,225,584, which is a (Continued)

(51) **Int. Cl.**
H04N 21/218 (2011.01)
H04N 21/234 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC ... ***H04N 21/23424*** (2013.01); ***H04N 21/2181*** (2013.01); ***H04N 21/2353*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/2181; H04N 21/23424; H04N 21/2353; H04N 21/2358; H04N 21/23614; H04N 21/26258; H04N 21/2668
(Continued)

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Primary Examiner — Dominic D Saltarelli
(74) *Attorney, Agent, or Firm* — Buchanan Ingersoll & Rooney PC

(57) **ABSTRACT**

A user can create a video segment or employ an existing video segment, upload the segment to a server, indicate an advertisement to be associated with the video, and then send it to a recipient over a computer network. The user provides an indication that one or more particular video segments and advertisements are to be shared over the network. An identifier for the video segment is automatically created and the segment and the identifier are automatically uploaded to a host computer over the network such as the Internet. The video segment, the identifier (optionally with other identifying material such as an identity of the sender, and an advertisement selected by the sender can be stored at the direction of the host computer.

7 Claims, 16 Drawing Sheets

Title: SYSTEMS AND METHODS FOR SHARING VIDEO WITH ADVERTISEMENTS OVER A NETWORK

Priority Date: Aug. 3, 1999

Filed Date: Jan. 23, 2019

Issued Date: Jul. 23, 2019

Expiration Date: Feb. 3, 2020

Inventors: Gad Liwerant; Christopher Dodge; Guillaume Boissiere

Claims: 1, 2, 3, 4, 5, 6, 7

This chart is intended to provide preliminary notice of each claim and claim element currently alleged infringed, identify the Accused Instrumentalities, and identify where and/or how claim elements may be found within some of the Accused Instrumentalities.

This chart is not intended to marshal all Plaintiff's evidence or otherwise prove Plaintiff's infringement case, in whole or in part.

This chart is provided before disclosures by or discovery from Defendant. Accordingly, Plaintiff reserves the right to unilaterally amend and/or supplement its infringement theories as counsel's investigation continues, and/or after Defendant's disclosures and discovery responses.

Plaintiff's infringement theories and details provided herein are subject to change and may be amended and/or supplemented at any time in a manner not inconsistent with the Court's Scheduling Order.

Claim 1

A method for sharing video over a **(6) structured hierarchical network** comprising:

a **(1) first server system** receiving a **(2) first video file** in a **(3) first format** from a **(4) first client** via the **(6) structured hierarchical network**;

the **(1) first server system** creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the **(2) first video file** from the **(3) first format** to the **(8) second format**, **(9) independent from receiving a command** from the **(4) first client** to perform such conversion;

the **(1) first server system** storing the **(2) first video file** and the **(7) second video file**;

the **(1) first server system** generating an **(13) identifier for video content corresponding to** the **(2) first video file** and the **(7) second video file**;

the **(1) first server system** receiving a request to stream the **(13) identified video content** to a **(18) second server system or a second client** via the **(6) structured hierarchical network**;

the **(1) first server system** sending the stored **(2) first video file** or the stored **(7) second video file** corresponding to the **(13) identified video content** to the **(18) second server system or the second client** via the **(6) structured hierarchical network** depending on a **(19) compatibility of the second server system or a compatibility of the second client** with the **(3) first format** or the **(8) second format**; and

the **(1) first server system** sending an **(20) advertisement for display** with the **(13) identified video content** sent in the stored **(2) first video file** or the stored **(7) second video file**.

Claim 2
The method of claim 1, wherein the **(20) advertisement** is a **(21) static image**.

Claim 3

The method of claim 1, wherein the **(20) advertisement** is a **(22) non-static image**.

Claim 4

The method of claim 1, wherein the **(20) advertisement** is selected based on the **(18) second client**.

Claim 5
The method of claim 1, wherein the **(20) advertisement** is stored in a **(23) third video file**.

Claim 6
The method of claim 1, wherein the **(20) advertisement** is sent to the **(18) second client** concurrent with the sending of the stored **(2) first video file** or the stored **(7) second video file**.

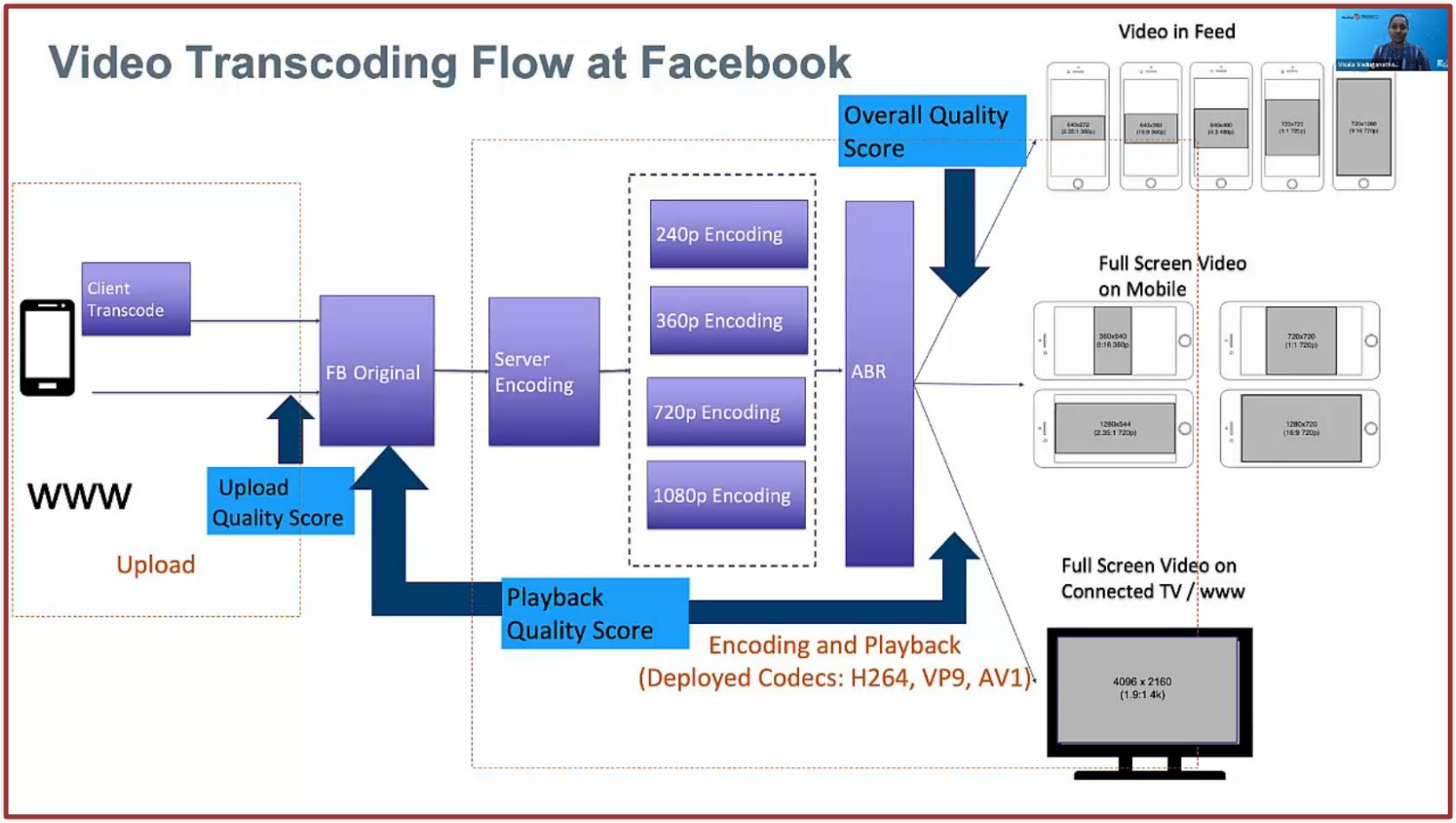
Claim 7

The method of claim 1, wherein the **(20) advertisement** includes an **(24) Internet link**.

Claim 1

A method for sharing video over a **(6) structured hierarchical network** comprising:

6



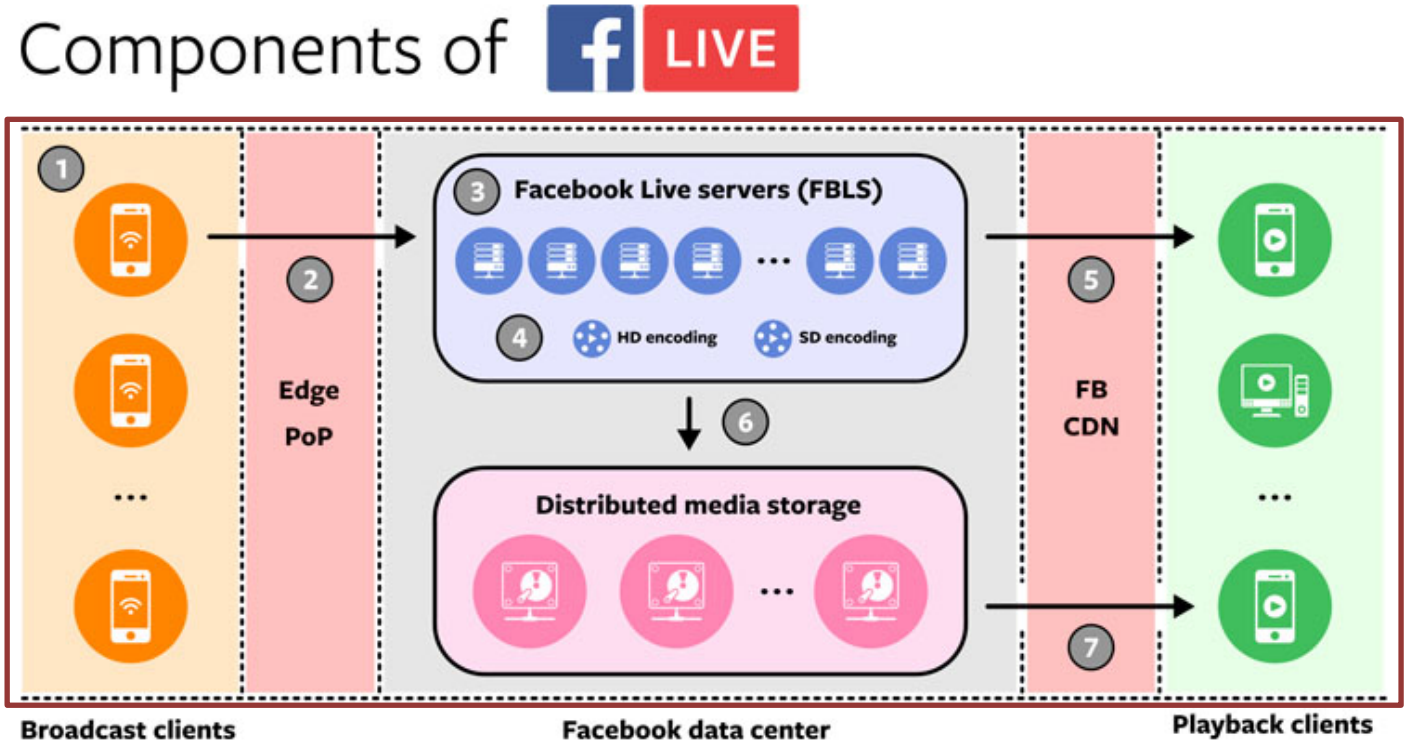
Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

A method for sharing video over a **(6) structured hierarchical network** comprising:

Architecture of Facebook Live

To understand the different ways in which increased traffic affects these systems, let's review the general architecture of Facebook Live and how the data flows through the system:

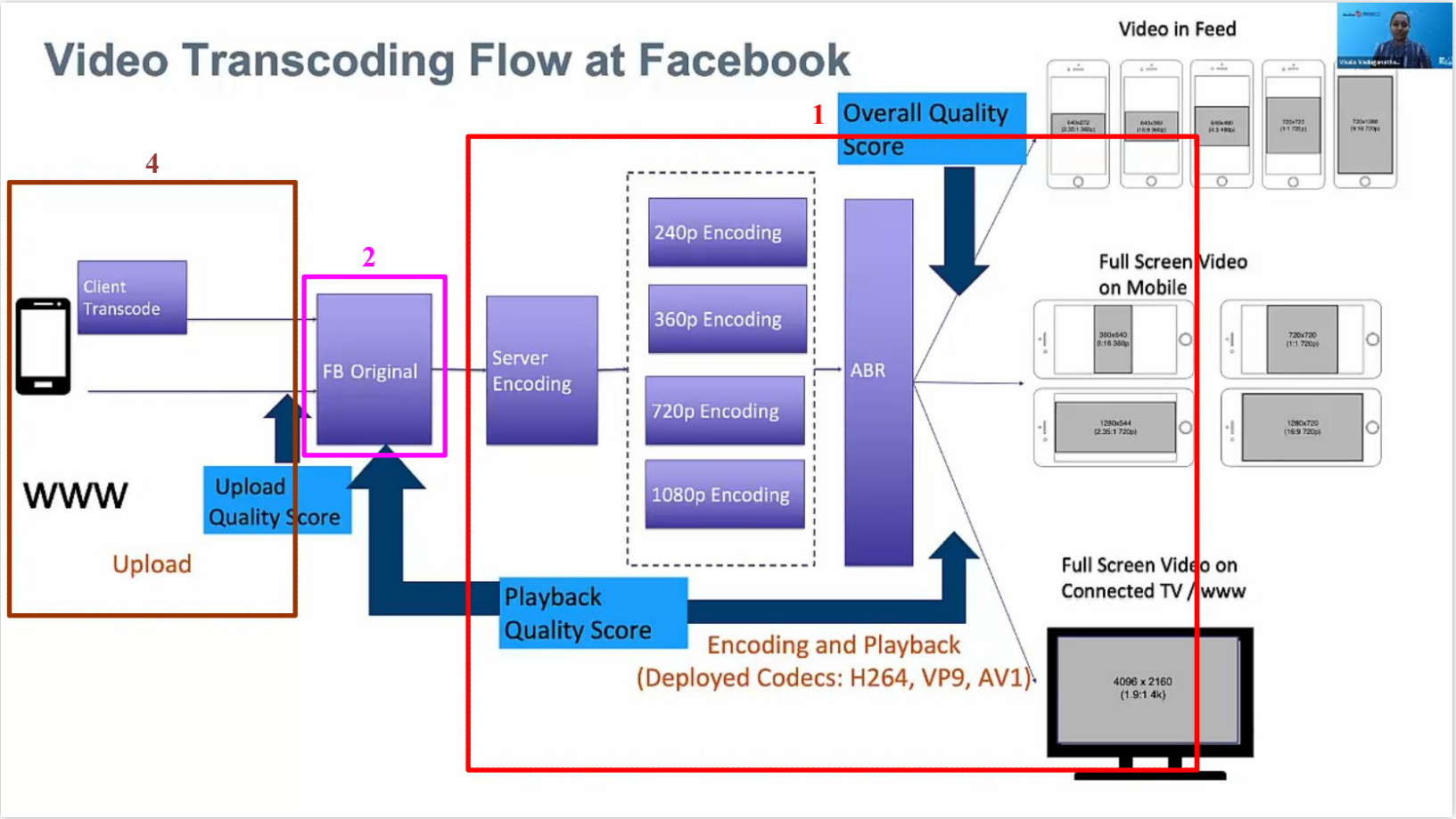


6

Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

a **(1) first server system** receiving a **(2) first video file** in a first format from a **(4) first client** via the structured hierarchical network;



Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

a **(1) first server system** receiving a **(2) first video file** in a first format from a first client via the structured hierarchical network;

Facebook maintains multiple data centers and servers for the purpose of receiving **(2) video files** uploaded by users which individually and/or collectively comprise a **(1) first server system**.

2 1

Traditionally, once a video is uploaded to Facebook, the process to enable ABR kicks in and the original video is quickly re-encoded into multiple resolutions (e.g., 360p, 480p, 720p, 1080p). Once the encodings are made, Facebook's video encoding system tries to further improve the viewing experience by using more advanced codecs, such as VP9, or more expensive "recipes" (a video industry term for fine-tuning transcoding parameters), such as H264 very slow profile, to compress the video file as much as possible. Different transcoding technologies (using different codec types or codec parameters) have different trade-offs between compression efficiency, visual quality, and how much computing power is needed.

Source: https://engineering.fb.com/2021/04/05/video-engineering/how-facebook-encodes-your-videos/

Claim 1

a first server system receiving a **(2) first video file** in a **(3) first format** from a first client via the structured hierarchical network;

(2) Uploaded video files are in some **(3) first format**, for example, the MP4 format.

Recommend Upload Specs

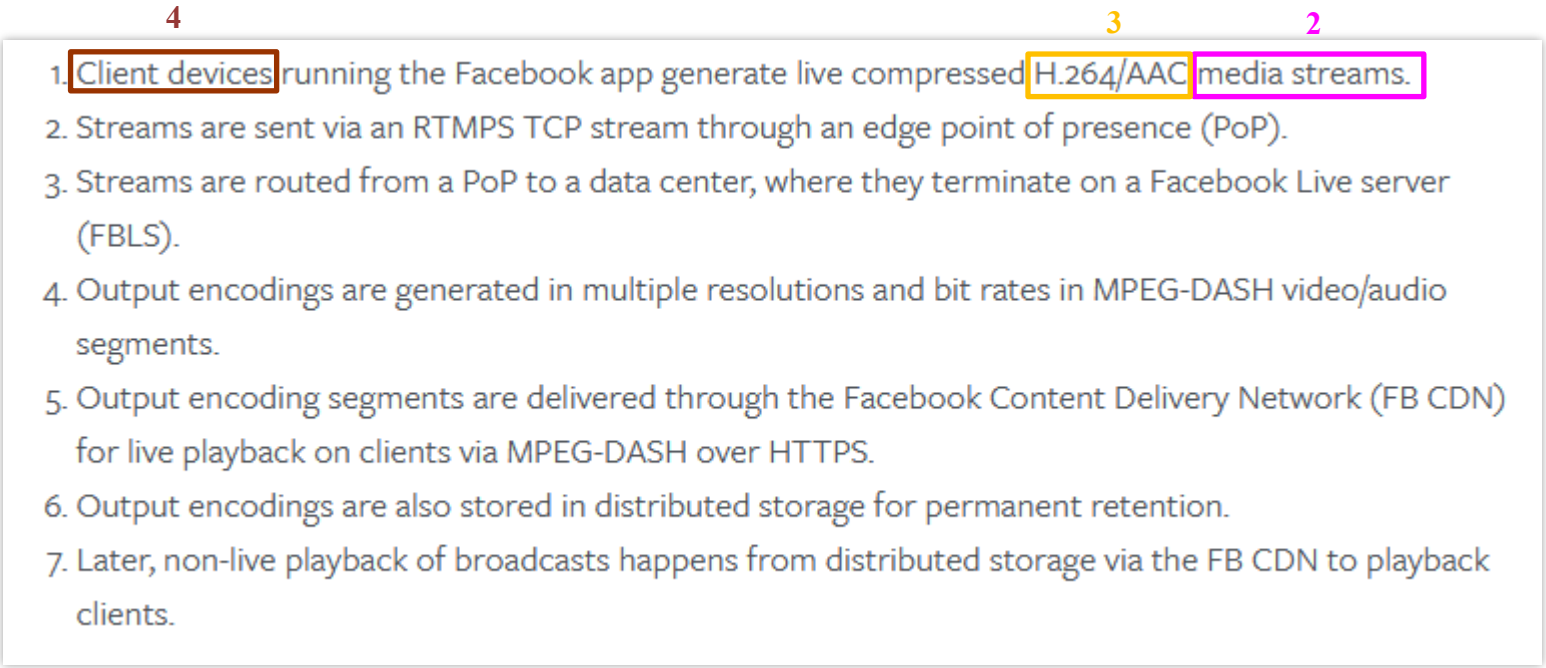
- We support almost all types of video files (2), but recommend using the MP4 format (3).
- Resolution should be **1080p or under**. To optimize the quality of your videos, upload HD video.
- Although we support file sizes up to **2.3 GB**, there may be longer upload times associated with larger files on slower Internet connections. If the video exceeds this size please reach out to your Partner Manager about having your Page whitelisted for a larger file size [8GB + 60 minutes]
- Videos must be less than **60 minutes long**. The longer your video is, the larger its file size will be. This may affect the quality of the video and the time it takes to upload.
- We also recommend **Stereo AAC audio** compression with 128kbps, or more, preferred.

Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

a first server system receiving a **(2) first video file** in a **(3) first format** from a **(4) first client** via the structured hierarchical network;

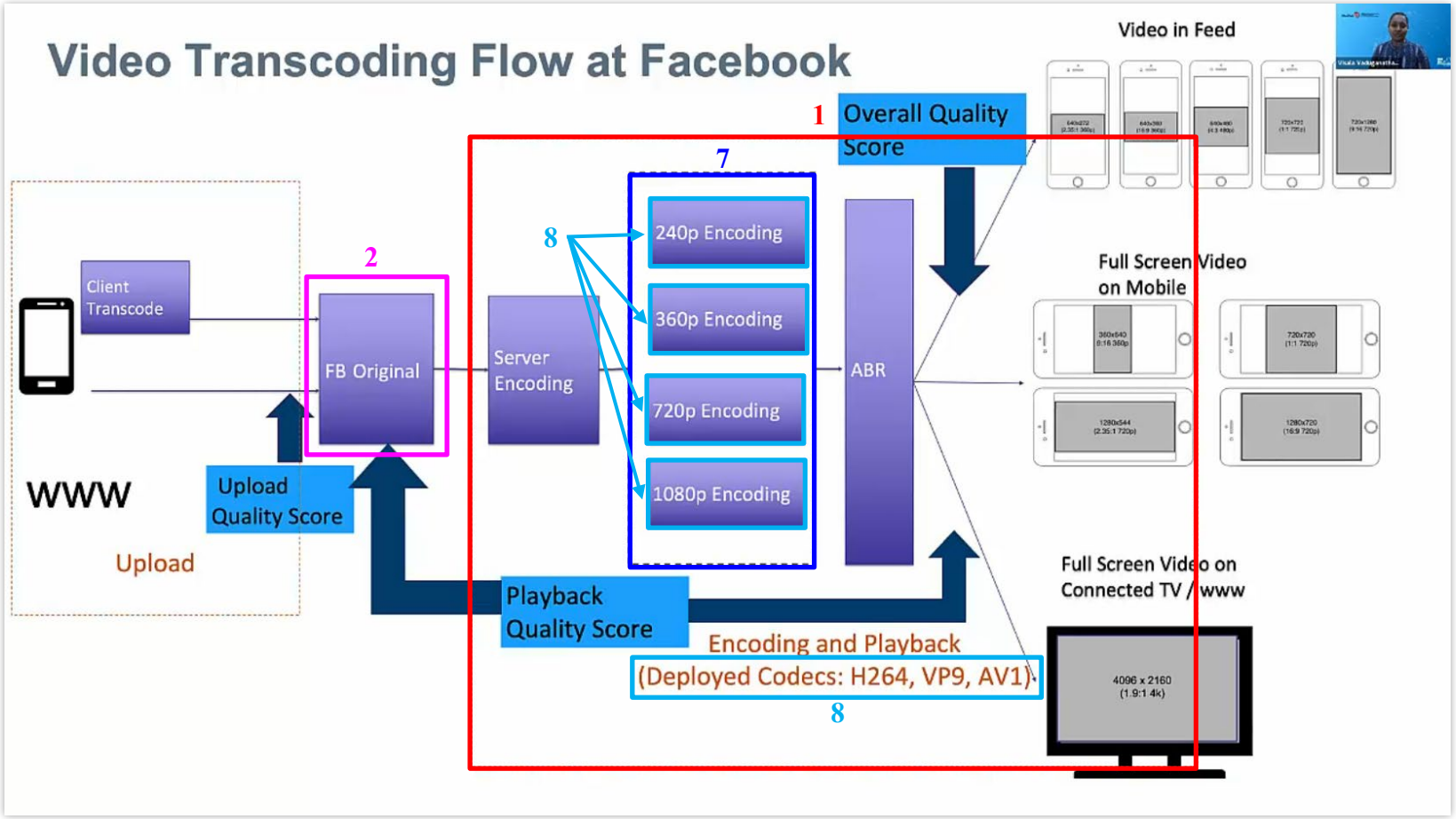
(2) Uploaded video files are in some **(3) first format**, for example, H.264 video encoding with AAC audio encoding.



Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

the **(1) first server system** creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the **(2) first video file** from the first format to the **(8) second format**,



Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

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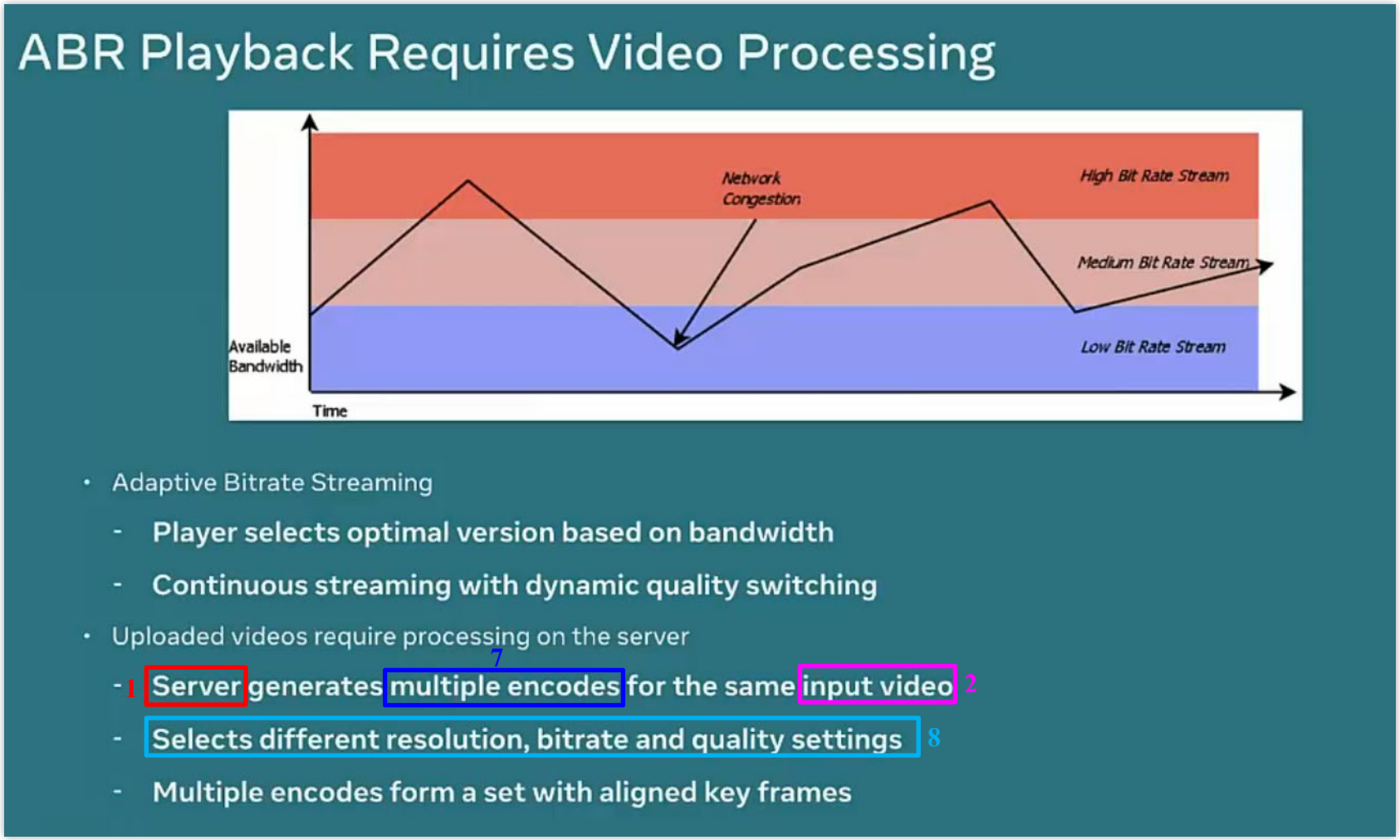
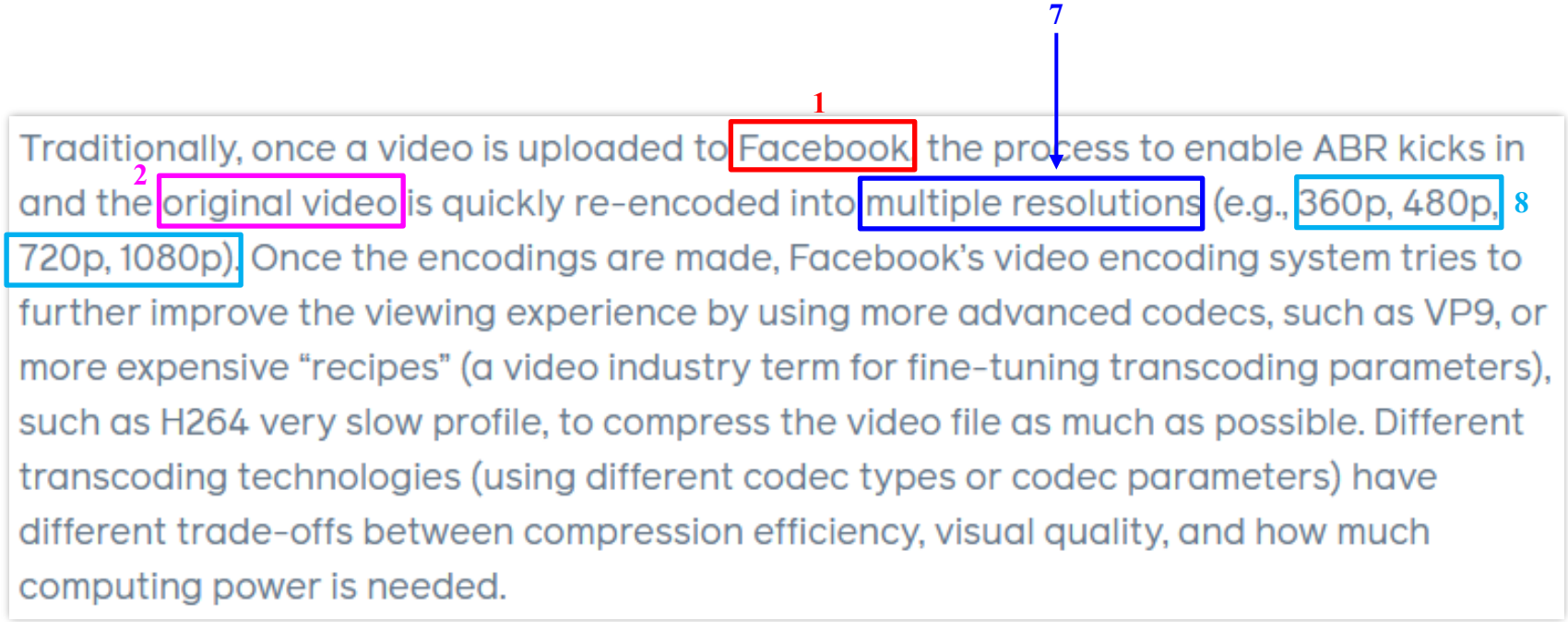


Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

the **(1) first server system** creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the **(2) first video file** from the first format to the **(8) second format**,

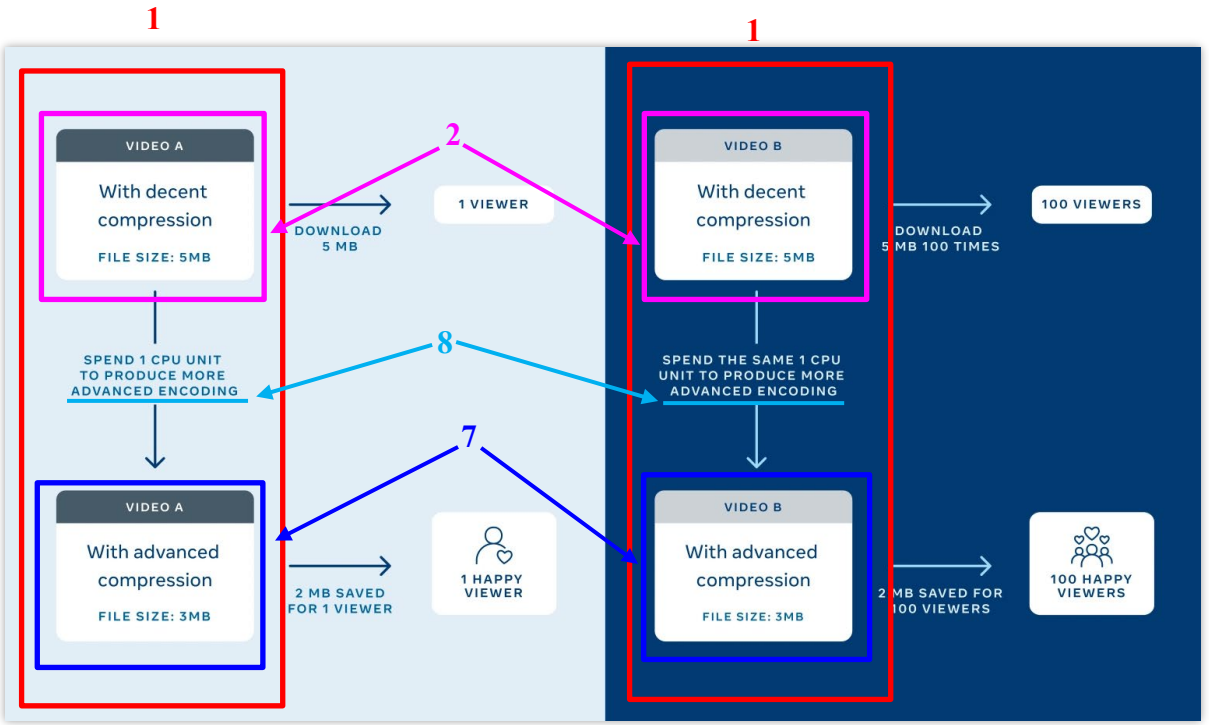
(2) Uploaded video files are converted by Facebook's **(1) first server system** into one or more **(7) second video files** in one or more **(8) second formats**, for example, the **(8) second format** may differ in resolution.



Source: https://engineering.fb.com/2021/04/05/video-engineering/how-facebook-encodes-your-videos/

Claim 1

the **(1) first server system** creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the **(2) first video file** from the first format to the **(8) second format**,



A video consumes computing resources only the first time it is encoded. Once it has been encoded, the stored encoding can be delivered as many times as requested without requiring additional compute resources.

Source: https://engineering.fb.com/2021/04/05/video-engineering/how-facebook-encodes-your-videos/

Claim 1

the first server system creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the first video file from the first format to the **(8) second format**,

1. Client devices running the Facebook app generate live compressed H.264/AAC media streams.
2. Streams are sent via an RTMPS TCP stream through an edge point of presence (PoP).
3. Streams are routed from a PoP to a data center, where they terminate on a Facebook Live server (FBLS).
4. Output encodings are generated (7) in multiple resolutions and bit rates (8) in MPEG-DASH video/audio segments.
5. Output encoding segments are delivered through the Facebook Content Delivery Network (FB CDN) for live playback on clients via MPEG-DASH over HTTPS.
6. Output encodings are also stored in distributed storage for permanent retention.
7. Later, non-live playback of broadcasts happens from distributed storage via the FB CDN to playback clients.

Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

the first server system creating a **(7) second video file** in a **(8) second format** by converting at least a portion of the first video file from the first format to the **(8) second format**,

Bringing latency down

Where building Live for Facebook Mentions was an exercise in making sure the system didn't get overloaded, building Live for people was an exercise in reducing latency. People who aren't public figures are more likely to be broadcasting to a small, interactive group. It was important to us that people be able to have near real-time conversations without an awkward data transmission delay. To bring latency down to a two- to three-second transmission, we decided to use RTMP.

RTMP is a streaming protocol that maintains a persistent TCP connection between the player and the server during the whole broadcast. Unlike HLS, RTMP uses a push model. Instead of the player requesting each segment, the server continuously sends video and audio data. The client can still issue pause and resume commands when the person requests it or when the player is not visible. In RTMP, the broadcast is split into two streams: a video stream and an audio stream. The streams are split into chunks of 4 KB, which can be multiplexed in the TCP connection, i.e., video and audio chunks are interleaved. At a video bit rate of 500 Kbps, each chunk is only 64 ms long, which, compared with HLS segments of 3 seconds each, produces smoother streaming across all components. The broadcaster can send data as soon as it has encoded 64 ms of video data; the transcoding server can process that chunk and produce multiple output bit rates. The chunk is then forwarded through proxies until it reaches the player. The push model plus small chunks reduce the lag between broadcaster and viewer by 5x, producing a smooth and interactive experience. Most of the live stream products use HLS because it's HTTP-based and easy to integrate with all existing CDNs. But because we wanted to implement the best live streaming product, we decided to implement RTMP by modifying nginx-rtmp module, and developed an RTMP proxy. The lessons learned from the HLS path also allowed us to implement an RTMP architecture that effectively scales to millions of broadcasters.

7,8

Source: https://engineering.fb.com/2015/12/03/ios/under-the-hood-broadcasting-live-video-to-millions/

Claim 1

(9) independent from receiving a command from the first client to perform such conversion;

Facebook's **(9) transcoding server is responsible for automatically performing conversions** on input video content.

Bringing latency down

Where building Live for Facebook Mentions was an exercise in making sure the system didn't get overloaded, building Live for people was an exercise in reducing latency. People who aren't public figures are more likely to be broadcasting to a small, interactive group. It was important to us that people be able to have near real-time conversations without an awkward data transmission delay. To bring latency down to a two- to three-second transmission, we decided to use RTMP.

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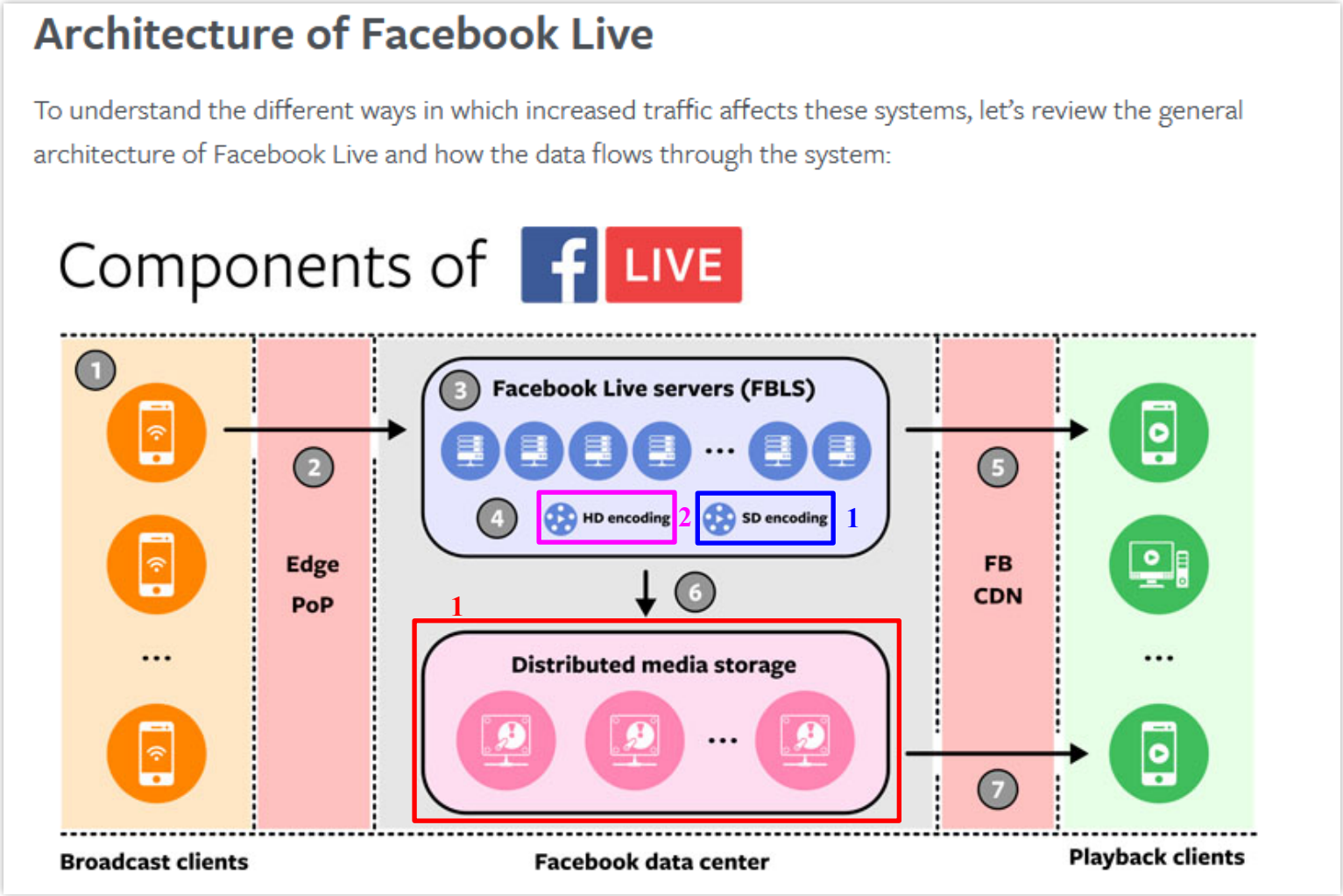
Source: https://engineering.fb.com/2015/12/03/ios/under-the-hood-broadcasting-live-video-to-millions/

Claim 1

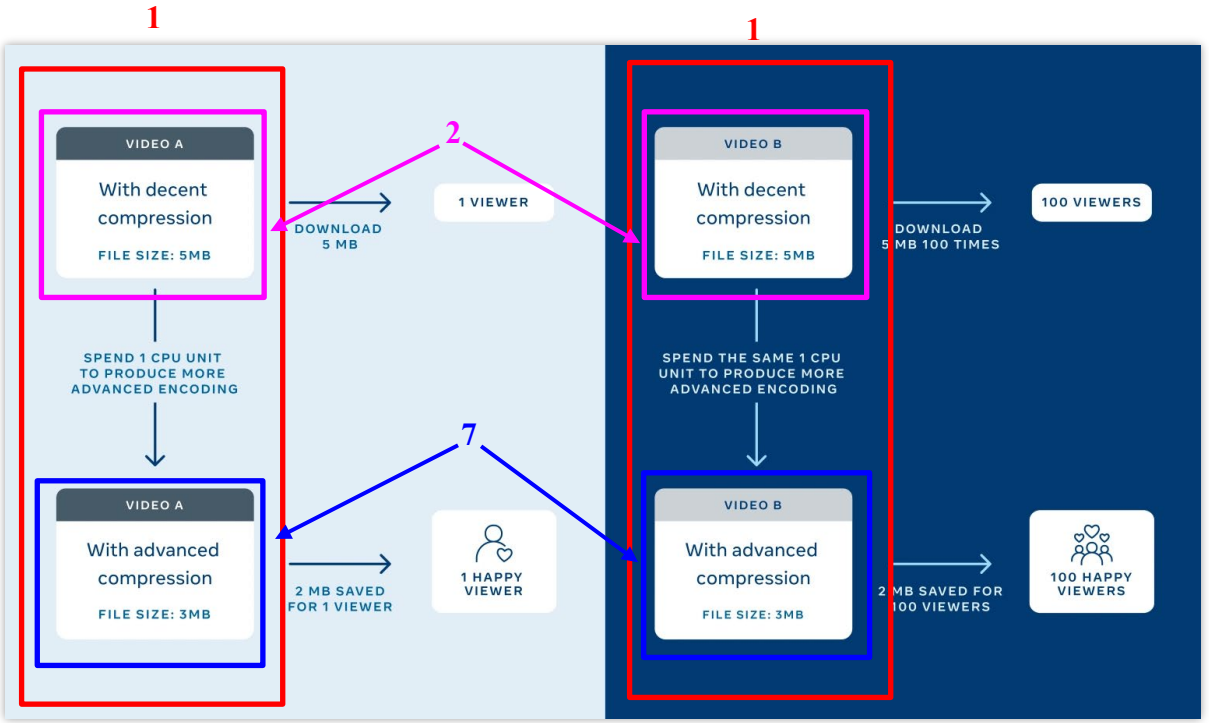
the **(1) first server system** storing the **(2) first video file** and the **(7) second video file**;



Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

the **(1) first server system** storing the **(2) first video file** and the **(7) second video file**;

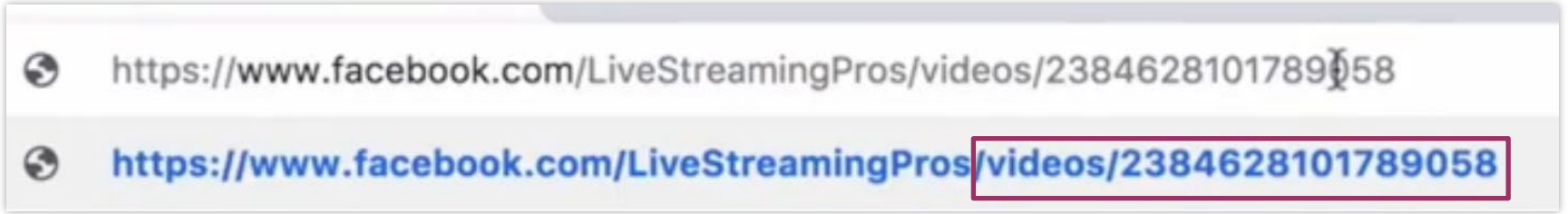


A video consumes computing resources only the first time it is encoded. Once it has been encoded, the stored encoding can be delivered as many times as requested without requiring additional compute resources.

Source: https://engineering.fb.com/2021/04/05/video-engineering/how-facebook-encodes-your-videos/

Claim 1

the **(1) first server system** generating an **(13) identifier for video content corresponding to** the first video file and the second video file;



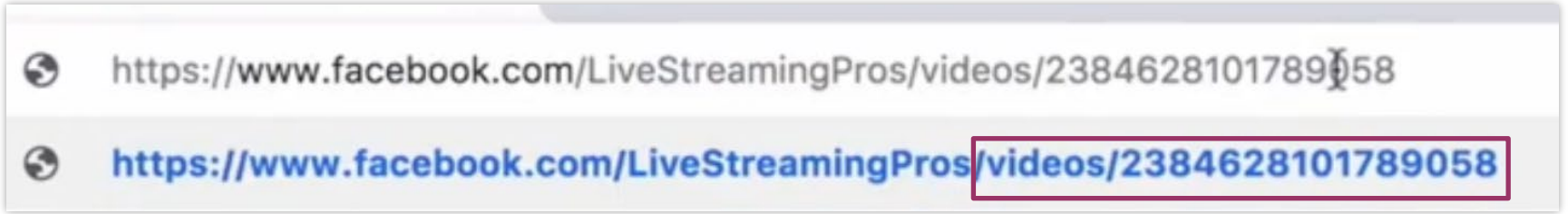
13

Facebook's **(1) first server system** assigns a unique id to video content, thus creating an **(13) identifier for that content**.

Source: https://www.youtube.com/watch?v=6oN74Xm3QW8&feature=emb_logo

Claim 1

the **(1) first server system** receiving a request to stream the **(13) identified video content** to a **(18) second server system or a second client** via the **(6) structured hierarchical network**;



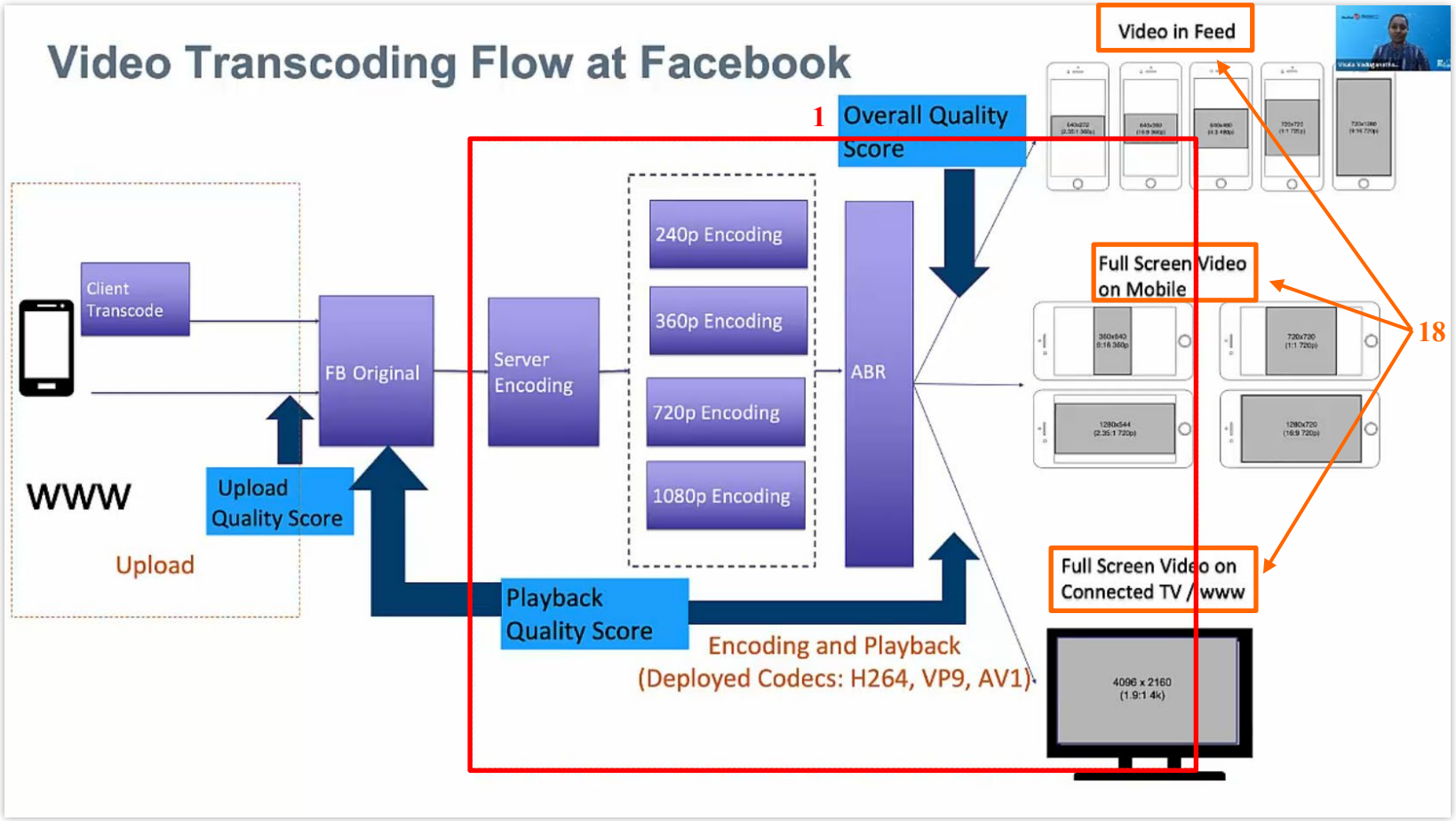
13

Video content is requested from Facebook's **(1) first server system** by a **(18) second client or second server system** (for example, a mobile or web application being operated by a user) using an identifier for the **(13) identified video content**.

Source: https://www.youtube.com/watch?v=6oN74Xm3QW8&feature=emb_logo

Claim 1

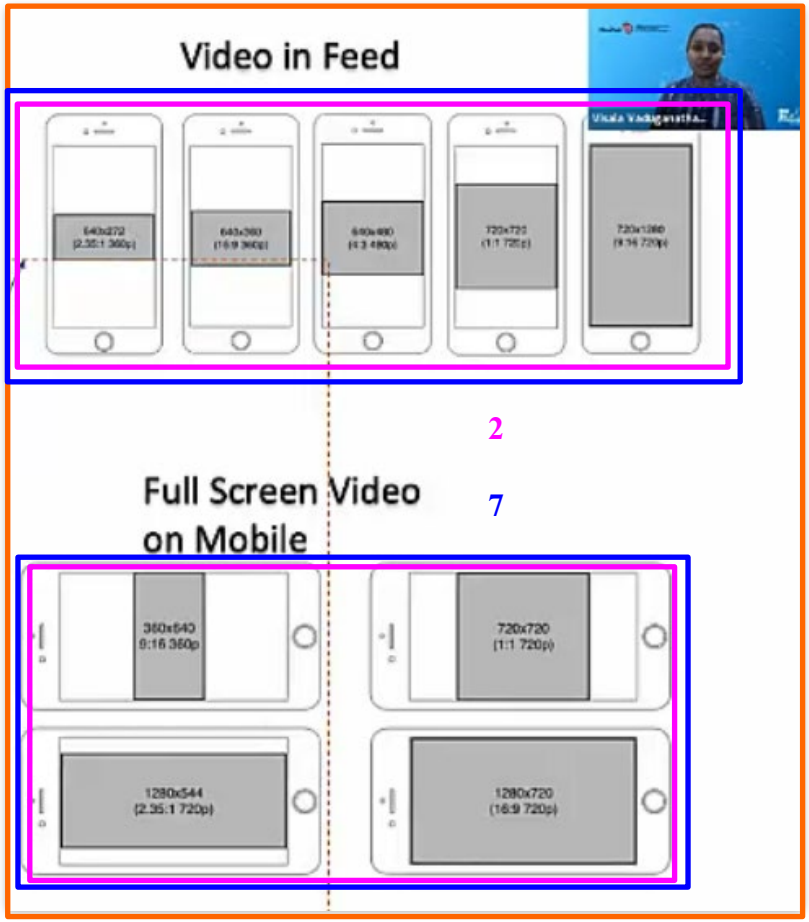
the **(1) first server system** sending the stored first video file or the stored second video file corresponding to the identified video content to the **(18) second server system or the second client**



Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

the first server system sending the stored **(2) first video file** or the stored **(7) second video file** corresponding to the identified video content to the **(18) second server system or the second client**



Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

the **(1) first server system** sending the stored **(2) first video file** or the stored **(7) second video file** corresponding to the **(13) identified video content** to the **(18) second server system or the second client**

2

1. Client devices running the Facebook app generate live compressed H.264/AAC media streams.
2. Streams are sent via an RTMPS TCP stream through an edge point of presence (PoP).
3. Streams are routed from a PoP to a data center, where they terminate on a Facebook Live server (FBLS).

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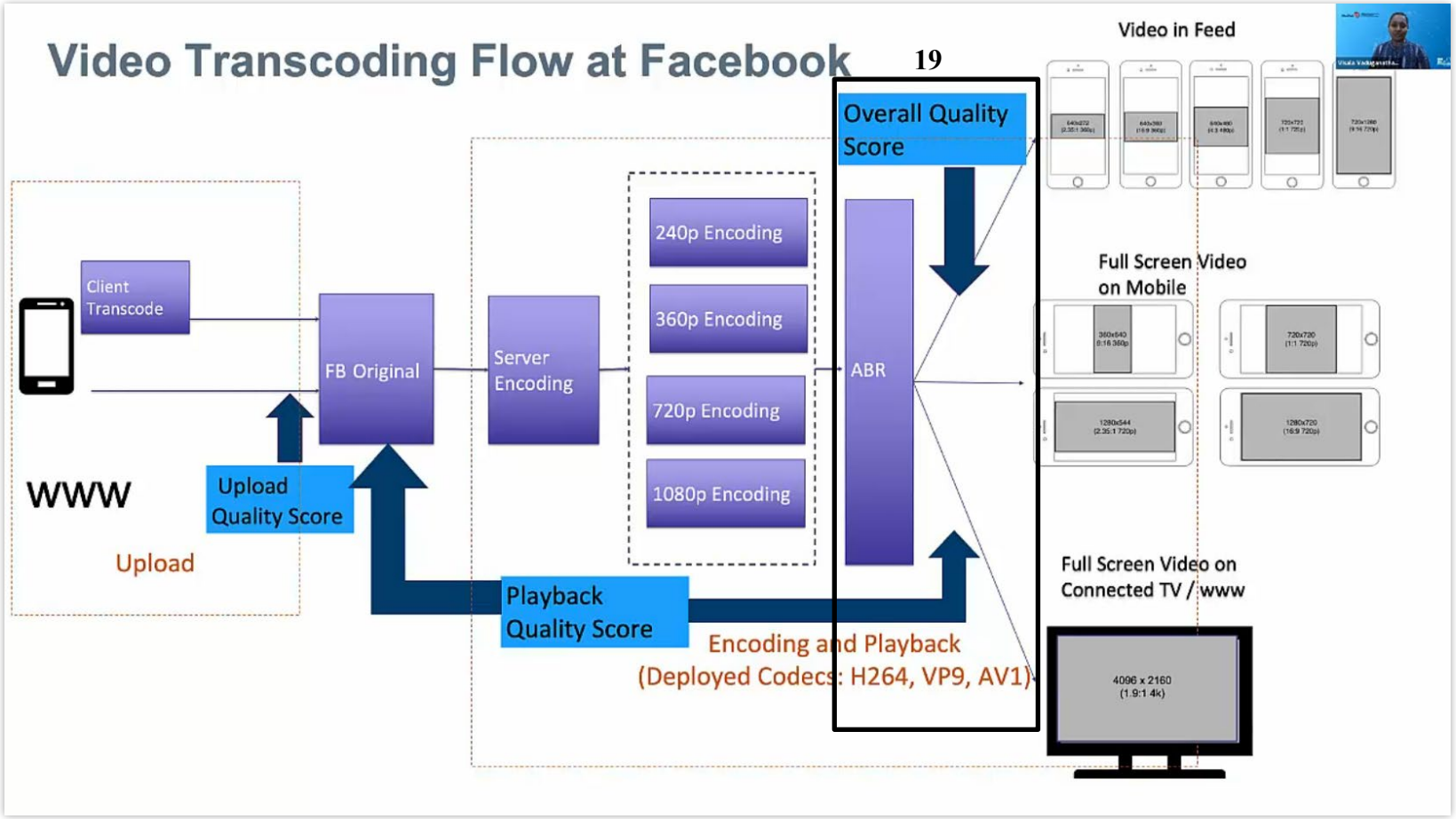
4. Output encodings are generated in multiple resolutions and bit rates in MPEG-DASH video/audio segments.
5. Output encoding segments are delivered through the Facebook Content Delivery Network (FB CDN) for live playback on clients via MPEG-DASH over HTTPS.
6. Output encodings are also stored in distributed storage for permanent retention.
7. Later, non-live playback of broadcasts happens from distributed storage via the FB CDN to playback clients.

In response to this request, Facebook's **(1) first server system** sends the **(2) first video file** or **(7) second video file** corresponding to the **(13) identifier** to the **(18) second client or second server system**.

Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

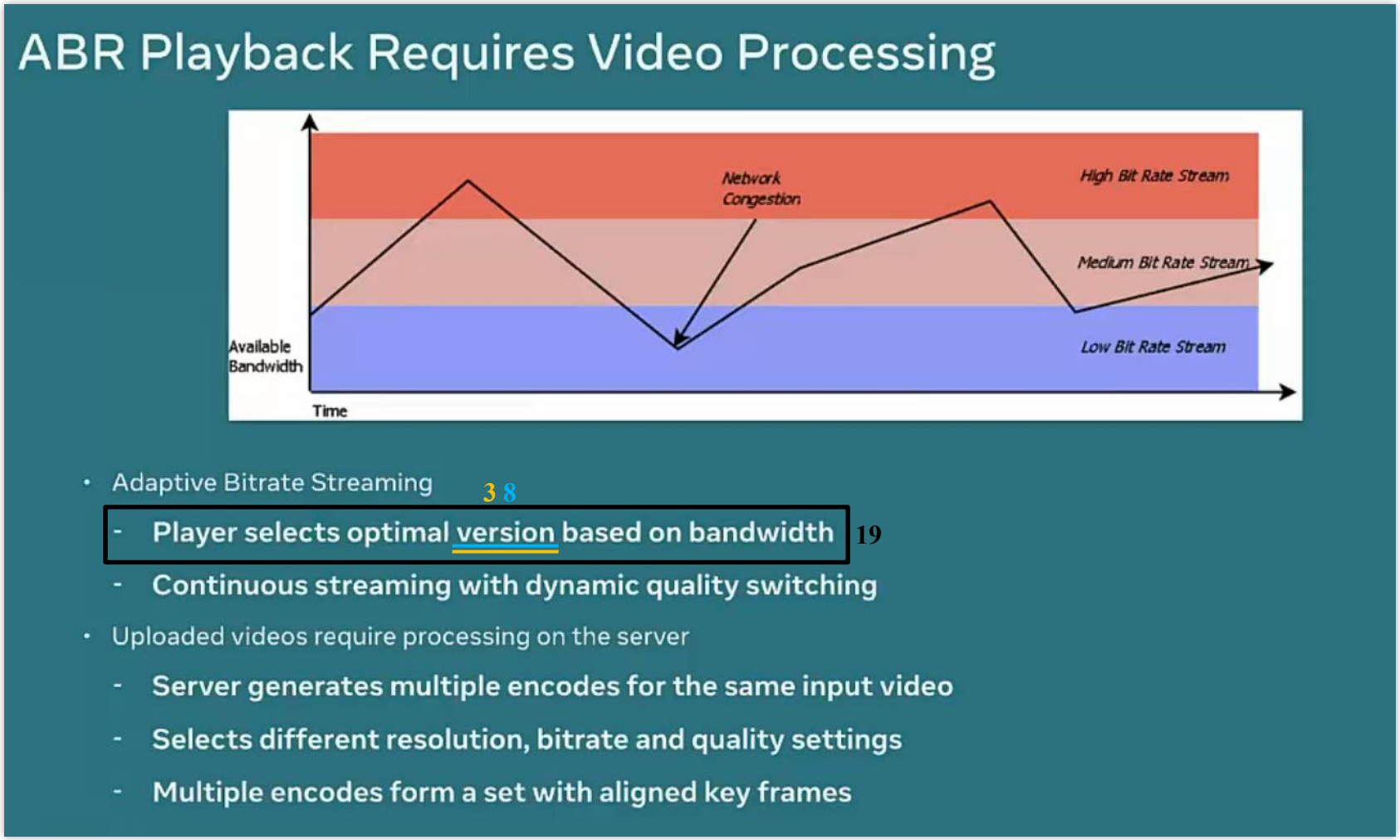
via the structured hierarchical network depending on a **(19) compatibility of the second server system or a compatibility of the second client** with the first format or the second format; and



Source: https://research.fb.com/blog/2020/10/what-video-infrastructure-research-looks-like-at-facebook/

Claim 1

via the structured hierarchical network depending on a **(19) compatibility of the second server system or a compatibility of the second client** with the **(3) first format** or the **(8) second format**; and



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Claim 1

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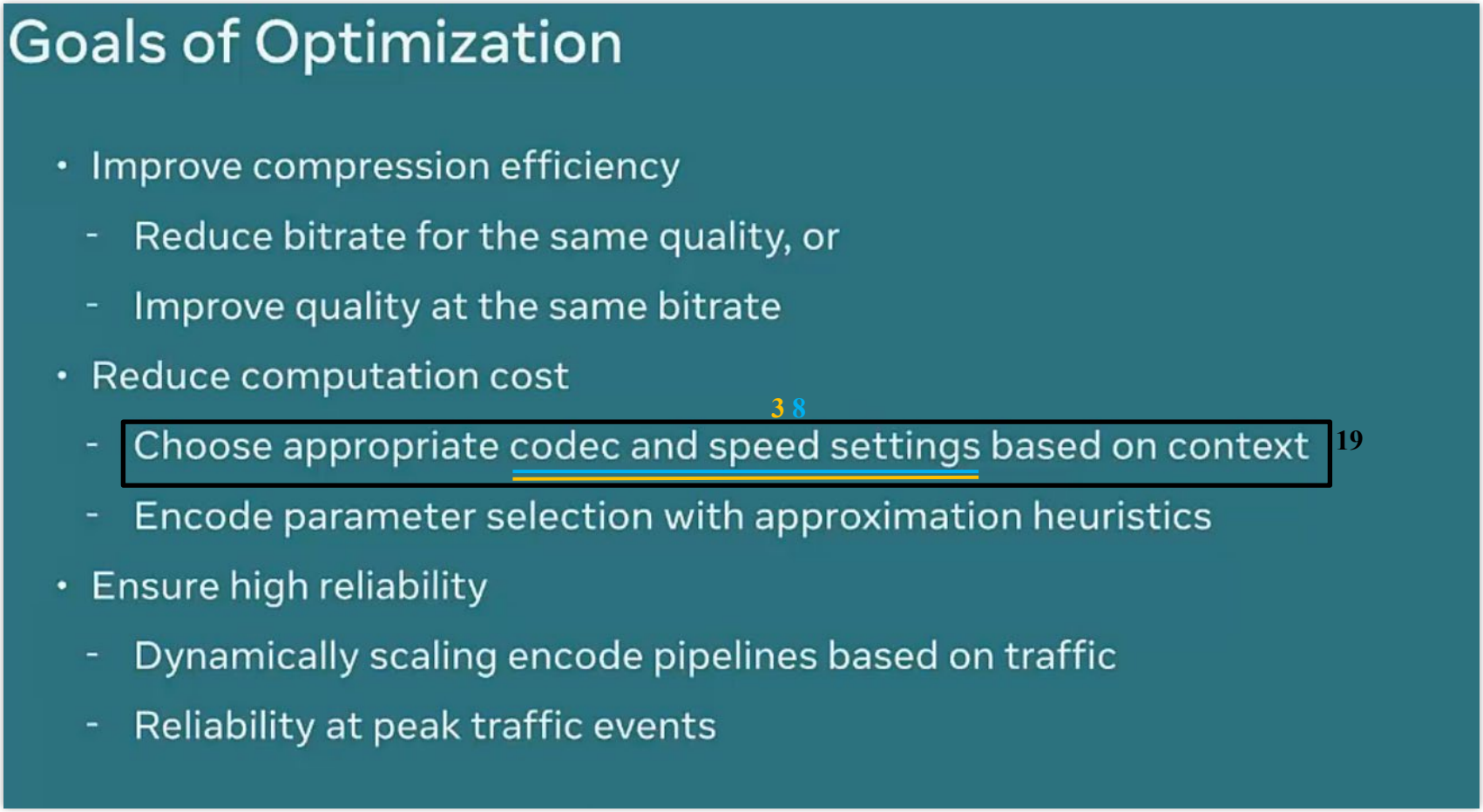

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Claim 1

via the structured hierarchical network depending on a **(19) compatibility of the second server system or a compatibility of the second client** with the **(3) first format** or the **(8) second format**; and

1. Client devices running the Facebook app generate live compressed H.264/AAC media streams.
2. Streams are sent via an RTMPS TCP stream through an edge point of presence (PoP).
3. Streams are routed from a PoP to a data center, where they terminate on a Facebook Live server (FBLS).
4. Output encodings are generated in multiple resolutions and bit rates in MPEG-DASH video/audio segments.
5. Output encoding segments are delivered through the Facebook Content Delivery Network (FB CDN) for live playback on clients via MPEG-DASH over HTTPS.[19]
6. Output encodings are also stored in distributed storage for permanent retention.
7. Later, non-live playback of broadcasts happens from distributed storage via the FB CDN to playback clients.

The purpose of generating multiple output video streams is so that when they are played back by clients, the appropriate format *(i.e.*, the **(3) first** or **(8) second format**) may be chosen based on **(19) which is compatible with the client**.

Source: https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/

Claim 1

the first server system sending an **(20) advertisement for display** with the identified video content sent in the stored first video file or the stored second video file.

20 There's a video ad for any business, any budget, any goal.

Whether this is your very first video ad or your next big campaign, you'll find the right video solution on Facebook. See where your ads can appear and then find recommended formats, tips and resources below.

In-stream

Create advertising that plays in the videos people watch.

Feed

Reach people where they share ideas and inspiration.

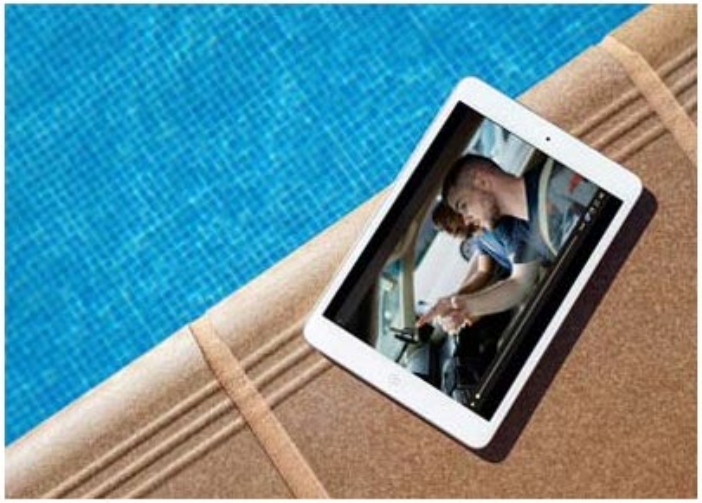
Stories

Create and engage just like your customers do.

Source: https://www.facebook.com/formedia/solutions/video

Claim 1

the first server system sending an **(20) advertisement for display** with the identified video content sent in the stored first video file or the stored second video file.



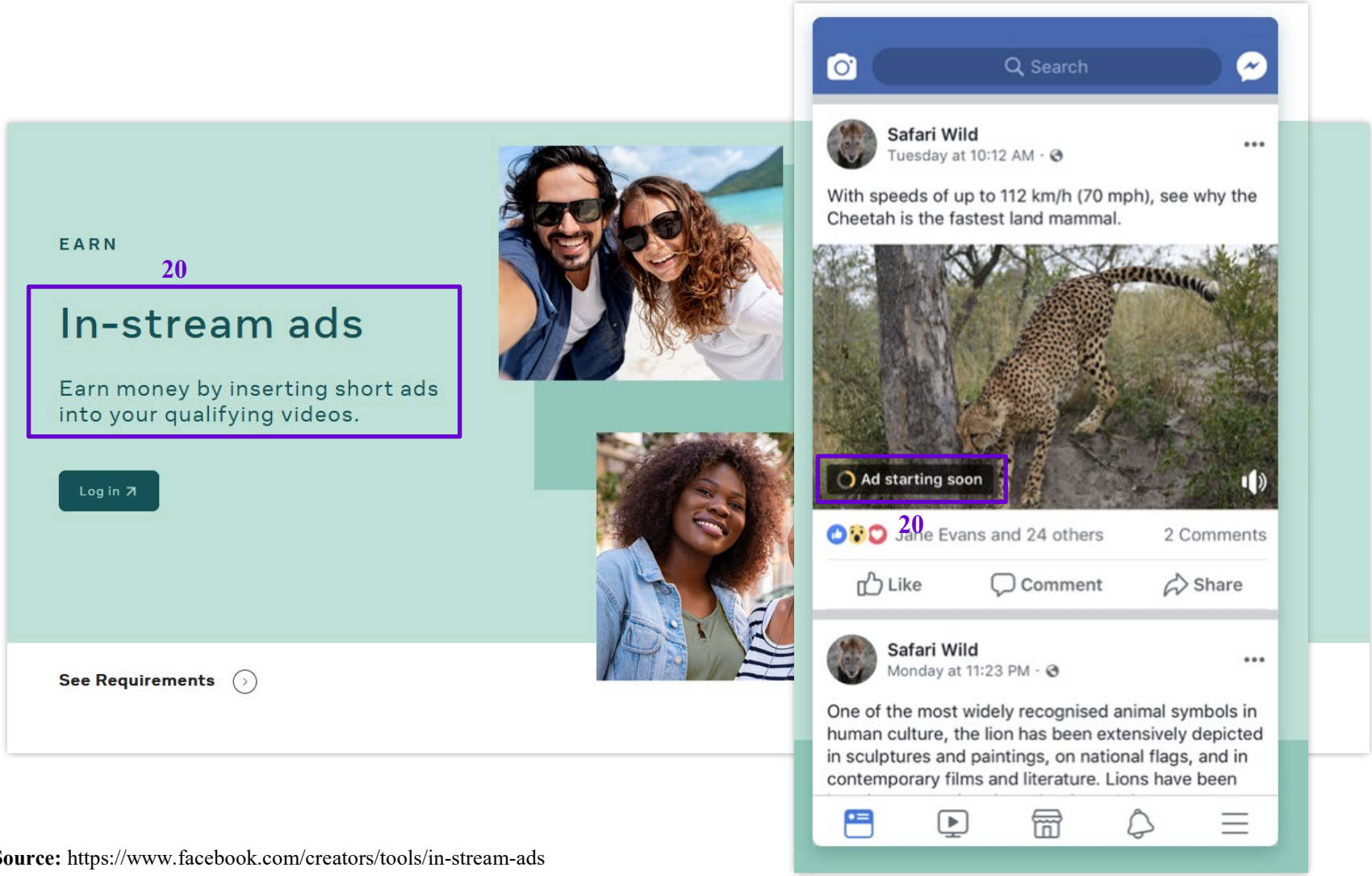
Easily Monetize Your Video Content

Video is one of the most monetizable forms of content on Facebook. Use in-stream ads or **20** Branded Content to let video views bolster your bottom line.

Source: https://www.facebook.com/formedia/solutions/video

Claim 1

the first server system sending an **(20) advertisement for display** with the identified video content sent in the stored first video file or the stored second video file.



Source: https://www.facebook.com/creators/tools/in-stream-ads

Claim 2

The method of claim 1, wherein the **(20) advertisement** is a **(21) static image**.

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21

Image Ads

Drive people to destination websites or apps through high-quality and engaging visuals. Use your own images or create an ad with stock photos to tell your story.

Get image ad specifications >

Learn more about image ads >

Video Ads

Show off product features and draw people in with sound and motion. Upload a video you created or create one in Ads Manager using the Video Creation Kit.

Get video ad specifications >

Learn more about video ads >

Source: https://www.facebook.com/business/ads-guide

Claim 3

The method of claim 1, wherein the **(20) advertisement** is a **(22) non-static image**.

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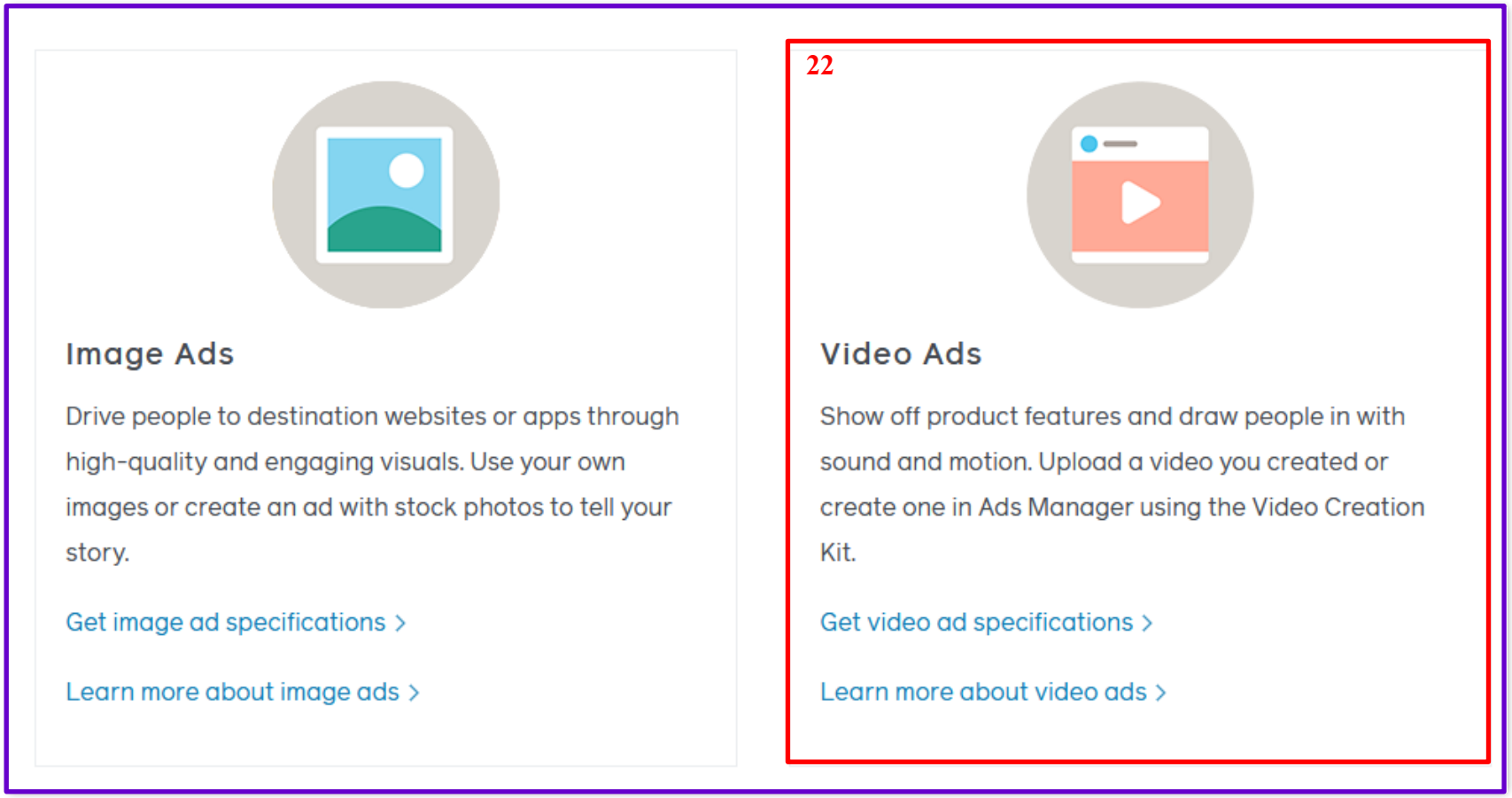
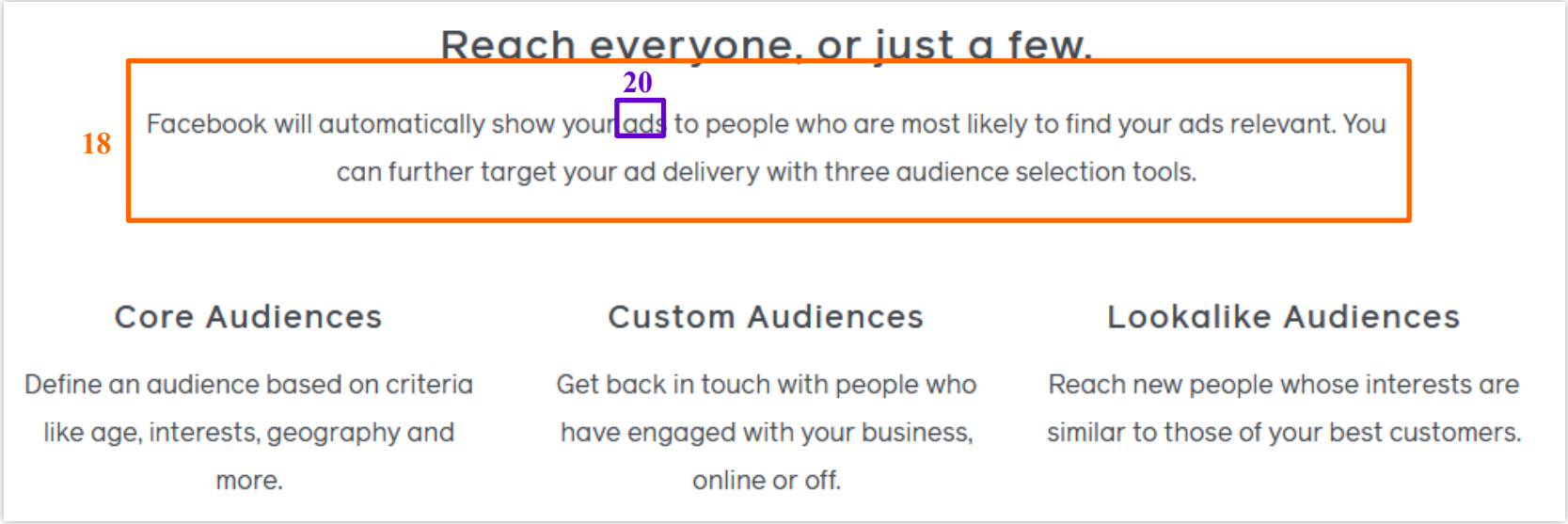


Source: https://www.facebook.com/business/ads-guide

Claim 4

The method of claim 1, wherein the **(20) advertisement** is selected based on the **(18) second client**.



Source: https://www.facebook.com/business/ads/ad-targeting

Claim 5

The method of claim 1, wherein the **(20) advertisement** is stored in a **(23) third video file**.

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Troubleshoot Video Ad Uploads

When creating a video ad, you may need to upload a new video from your computer. Since video files are typically large, your video may take a few minutes to upload.

If you are having trouble uploading the video, check:

23

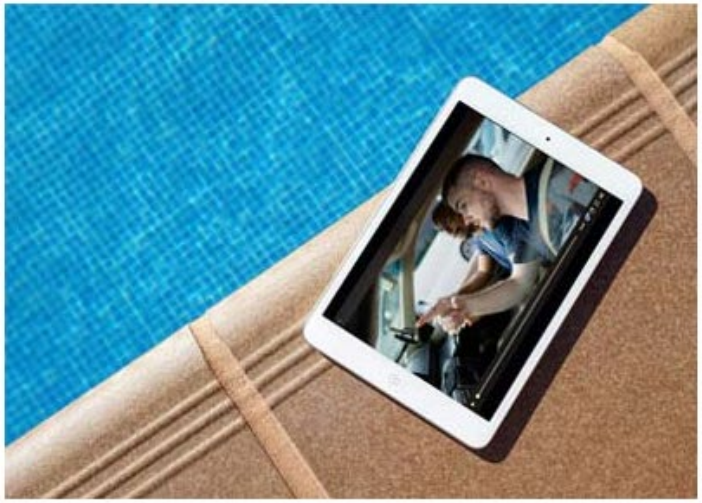
- **The format.** We recommend using a MP4, MOV or GIF file, but most file types are supported.
- **The size.** There is a maximum file size of 4GB for all videos.
- **The duration.** The maximum video duration varies across placements from 15 seconds to 240 minutes. Ensure that your video meets the requirements for your placement.
- **Your permissions.** You must have an appropriate page role to run ads.
- **Your browser.** Make sure you are using the most recent version.
- **Your network connection.** You will need a strong internet connection to upload files.
- **Your uploaded files.** You may have already uploaded the video in your Account Videos.

Source: https://www.facebook.com/business/help/1596868350601716?id=603833089963720

Claim 6

The method of claim 1, wherein the **(20) advertisement** is sent to the **(18) second client** concurrent with the sending of the stored **(2) first video file** or the stored **(7) second video file**.

In-stream ads are a form of **(20) advertisement** which is played in the middle of a video watch, *i.e.*, while the **(18) second client** is receiving the **(2) first video file** or the **(7) second video file**.



Easily Monetize Your Video Content

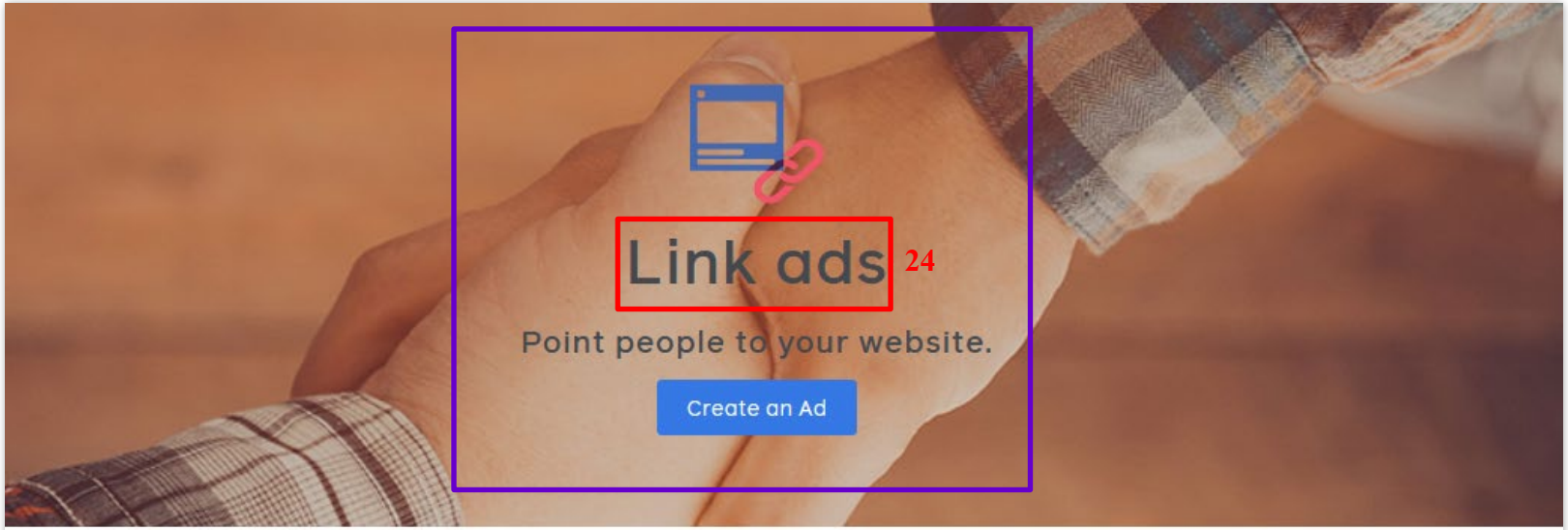
20

Video is one of the most monetizable forms of content on Facebook. Use in-stream ads or Branded Content to let video views bolster your bottom line.

Source: https://www.facebook.com/formedia/solutions/video

Claim 7

The method of claim 1, wherein the **(20) advertisement** includes an **(24) Internet link**.



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Inspire more clicks

Whether you want people to learn about your product, buy a ticket or download an ebook, Facebook link ads are a great way to get people clicking to your website and visiting the pages you'd like them to see.

Get people to take the actions you want with your choice of call-to-action buttons: Shop Now, Learn More, Sign Up, Book Now and Download. Link ads work across Facebook, Instagram and Audience Network.

Source: https://www.facebook.com/business/learn/facebook-link-ads